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QA Inspections Via Condition Monitoring

# Guidelines for Quality Assurance Inspection of Commercial Activities Contracts for Real Property Maintenance Activities

## Guide #3: Natural Gas Distribution Systems

by  
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Paul C. Bresnahan

A Quality Assurance (QA) Program allows the Army to evaluate and document a contractor's work performance. It depends on a QA Surveillance Plan (QASP). The QASP, which is based on the contract Performance Work Statement, lists contractor activities and the surveillance approach, number of items to be inspected, and an Acceptable Quality Level (AQL) for each activity. This series of 12 guides will help the Contracting Officer's Representative/Quality Assurance Evaluator by defining and clarifying the inspection tasks required by the QASP, which will facilitate inspection uniformity and effectiveness.

This guide discusses QA monitoring of natural gas distribution operations and maintenance systems.

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## **FOREWORD**

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The work was performed by the Facility Management Division (FF) of the Infrastructure Laboratory (FL), U.S. Army Construction Engineering Research Laboratories (USACERL). Alan W. Moore is Acting Chief, CECER-FF, and Dr. Michael J. O'Connor is Chief, CECER-FL. Special appreciation is expressed to Robert D. Neathammer, CECER-FF, and John H. Williamson, formerly of CECER-FF, for their contributions. The USACERL technical editor was Linda L. Wheatley, Information Management Office.

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# **GUIDELINES FOR QUALITY ASSURANCE INSPECTION OF COMMERCIAL ACTIVITIES CONTRACTS FOR REAL PROPERTY MAINTENANCE ACTIVITIES GUIDE #3: NATURAL GAS DISTRIBUTION SYSTEMS**

## **1 INTRODUCTION**

### **Background**

A Quality Assurance (QA) program allows the Army to evaluate and document a contractor's performance. The Quality Assurance Evaluator (QAE) conducts skilled and carefully planned inspections aimed at verifying the satisfactory completion of contractor work. The inspections evaluate the quality, quantity, and timeliness of the services provided, not the contractor's methods used in performing the work. A good QA program promotes the best possible product within the terms of the standing contract.

A well organized QA program depends on a QA Surveillance Plan (QASP), which is prepared by the Government and contains the purpose and methods of the QA program. Although the QASP is not a part of the contract, it is based on the contract Performance Work Statement, which is part of the contract. The QASP lists contractor activities and the surveillance approach, approximate number of items to be surveyed, and an Acceptable Quality Level (AQL) for each activity.

The installation Director of Public Works (DPW), the Contracting Officer (KO), or the Contracting Officer's Representative (COR) often oversees the QASP. The COR/QAE needs an inspection guide to help define and clarify the inspection tasks required by the QASP, and to facilitate inspection uniformity and effectiveness. To meet this need, the U.S. Army Construction Engineering Research Laboratories (USACERL) developed this series of 12 inspection guides.

### **Objective**

This guide series is intended to supplement any existing QASP and to provide QA guidance for evaluating Operations and Maintenance (O&M) work as performed by contractors on Army property. This natural gas distribution system guide contains recommended surveillance methods that can be amended by direction of the KO or QA management to fit the needs of a specific installation.

### **Guide Series Organization**

This series includes the following guides by USACERL published in October 1993:

- #1: Water Systems (Special Report [SR] FF-94/01)
- #2: Wastewater Systems (SR FF-94/02)
- #3: **Natural Gas Distribution Systems**
- #4: Electrical Systems (SR FF-94/04)
- #5: Heating Systems (SR FF-94/05)
- #6: Ventilation, Air Conditioning, and Refrigeration Systems (SR FF-94/06)
- #7: Building Services (SR FF-94/07)
- #8: Grounds Maintenance (SR FF-94/08)
- #9: Surfaced Areas (SR FF-94/09)



- #10: Refuse and Recyclable Handling (SR FF-94/10)
- #11: Pest Control Services (SR FF-94/11)
- #12: Custodial Services (SR FF-94/12).

The QAE is expected to evaluate a contractor's performance by applying appropriate visual and instrumentation procedures along with necessary technical and interpretive skills. This guide covers QAE inspection of water systems, and is divided into sections that take the inspector through a step-by-step process of recommended performance indicators, inspection tasks, and surveillance methods.

Natural gas distribution systems are divided into two subsystems in this guide:

1. Natural Gas Distribution Operations
2. Natural Gas Distribution Maintenance.

General QA information, including detailed explanations of the available surveillance methods, is given in Chapter 2.

Chapter 3 provides performance indicators, inspection tasks, and recommended surveillance approaches for each subsystem.

Appendix A contains sampling inspection tables. Appendix B contains QAE Worksheets for each subsystem and a service order questionnaire that may be reproduced for field use.

## **2 GENERAL QA INSPECTION INFORMATION**

### **Inspection Organization and Planning**

According to custom and standard practice, the contractor submits copies of the previous month's O&M activities and regulatory agency reports to the COR and the QAE. The due dates of these reports control the start of inspection scheduling. If possible, the QAE's inspection should be conducted within 3 days after receiving the reports. Effective coordination will allow more efficient inspection of services. The COR/QAE should look for specific indicators of the contractor's performance and should evaluate that performance based on Detailed Inspection Tasks. The following chapter lists the Performance Indicators and Detailed Inspection Tasks for natural gas distribution systems.

### **Quality Assurance Surveillance Methods**

The QAE can use the following five surveillance methods to determine contractor performance:

1. Random Sampling
2. Planned Sampling
3. 100 Percent Inspection
4. Unscheduled Inspection
5. Customer Complaints.

#### ***Random Sampling***

The methods are based on statistical criteria provided in Military Standard (MIL-STD)-105E, *Sampling Procedures and Tables for Inspection by Attributes* (10 May 1989) and are presented as recommendations. The methods used should be based on the unique needs of an individual system. Typically, all five methods are not used to evaluate an individual system.

Random sampling is recommended for situations where many work items are candidates for inspection. For instance, because it is impractical to inspect every roof on an installation with 500 buildings, only a select number of the buildings should be inspected. Likewise, in random sampling, only a portion of the total performed work is inspected. Acceptance of the work is based on the assumption that the inspected items are representative of the quality of the contractor's work. The random sampling technique spreads the selected samples evenly throughout the evaluation period. The following are steps to be used by the QAE in random sampling.

Tables A1 and A2 in Appendix A should be used to determine the number of samples to be inspected and the number of rejects allowed as a function of the number of inspected work items for AQLs of 4 and 10 percent, and the level of surveillance. The three levels of surveillance are: normal, increased (tightened), and reduced. Initially, this guide recommends normal surveillance for random sampling. However, under the direction of the KO, the level of surveillance can be changed depending on the contractor's performance.

As an example, assume that the contractor's total scheduled output (i.e., population size) for a particular work item is 125 units and that the normal surveillance level with an AQL of 4 percent has been selected. According to Table A1, 20 of the 125 units of work should be inspected, and the entire output of 125 units should be rejected if 3 or more of the 20 sample units are not acceptable.

The QA Worksheets in Appendix B provide room to record the population size, the number of samples, the maximum number of rejects, and the interval for each Performance Indicator.

The work planned by the contractor for each maintenance task should be listed by date to make it easier to predict the time when the work samples will be ready for inspection.

### *Planned Sampling*

Evaluation by planned sampling inspects some, but not all, of the work activities and is appropriate when the number of work items is large. Some items are evaluated before scheduled completion because they are inaccessible after the work is completed. The COR/QAE subjectively selects key work items for inspection; the sample size is determined arbitrarily.

The COR/QAE will normally use planned sampling when the contractor's performance at selected locations or tasks is poor. With this type of evaluation, the contractor knows that work performed in these areas is more likely to be monitored. Planned sampling provides a systematic way of focusing on specific output and forming conclusions about the contractor's performance level.

### *100 Percent Inspection*

Inspection at 100 percent requires total inspection of all items in a contract requirement. It is normally used to monitor infrequent work or critical contract work when the number of work items is small and in cases where nonperformance could seriously damage Army-furnished equipment or processes. It may also be used in areas where a contractor has had prior performance difficulties.

### *Unscheduled Inspection*

Unscheduled inspections can be used for areas of poor past contractor performance, noncritical areas, areas of infrequent repairs, or as a follow-up check of previous inspections. If the QAE notices such an area, an unscheduled inspection can be conducted to evaluate contractor performance.

### *Customer Complaints*

The customer complaint method is based on an informed and cooperative customer population, that is generally aware of local contract requirements. Customers are expected to monitor contractor services and, when performance is poor or nonexistent, to notify the COR/QAE. If investigation reveals that the complaint is valid, the COR/QAE documents the deficiency. Since this is a reactive QA inspection approach, this method of surveillance normally supplements planned inspection methods.

### **Increased Surveillance**

For areas of poor past contractor performance, the QAE should consult with the KO to intensify the surveillance method. More than one option is usually available, and selection should be based on the initial method and the amount of work performed.

1. Random Sampling (Normal Surveillance) can be replaced by:

- Random Sampling (Increased Surveillance)
- Planned Sampling (for a large population size)

- 100 Percent Inspection (for a small population size)
  - Unscheduled Inspection (for any population size).
2. Planned Sampling can be replaced by:
- Random Sampling (Normal Surveillance)
  - 100 Percent Inspection (for a small population size)
  - Unscheduled Inspection (for any population size).
3. Unscheduled Inspections can be replaced by:
- 100 Percent Inspection (for a small population size)
  - Random Sampling (Normal Surveillance)
  - Planned Sampling.

### **Decreased Surveillance**

For work areas in which the contractor maintains a consistently satisfactory performance for 3 to 6 months, the QAE should consult with the KO to decrease the intensity of the surveillance. More than one option is usually available and selection should be based on the initial method and the amount of work performed.

1. Random Sampling (Normal Surveillance) can be replaced by:
- Random Sampling (Reduced Surveillance)
  - Planned Sampling
  - Unscheduled Inspection (for any population size)
  - Customer Complaints.
2. Planned Sampling can be replaced by:
- Unscheduled Inspection (for any population size)
  - Customer Complaints.
3. 100 Percent Inspection can be replaced by:
- Random Sampling (Normal Surveillance)
  - Random Sampling (Reduced Surveillance)
  - Planned Sampling
  - Unscheduled Inspection (for any population size)
  - Customer Complaints.

### **3 NATURAL GAS DISTRIBUTION SYSTEM QA INSPECTIONS**

#### **Natural Gas Distribution Operations**

##### *Performance Indicators and Detailed Inspection Tasks*

The following numeric items are performed by the contractor. The related detailed inspection tasks are used by the QAE to verify the contractor's performance.

1. The operations activities checklist is complete, legible, and timely.

Verify that the operations checklist is complete, legible, and timely. All tasks must be listed, dated, designated as completed, and initialed by the person(s) who performed or accepted the work. Check for the following:

- a. Leakage surveys
- b. Valve maintenance
- c. Relief device testing
- d. Regulator station inspection
- e. Odorization content measurement
- f. Repairs
- g. System use measurement.

2. An adequate spare parts inventory is being maintained in case of emergency repairs.

Verify that the contractor maintains an adequate inventory of natural gas distribution spare parts (i.e., piping, fittings, valves, etc.) for emergency repairs. The number and types of spare parts should be determined locally as a percent of the equipment installed in the field; all gas main sizes should be represented.

3. If required, monthly readings for all gas customers are collected, recorded, and submitted.

Verify that the contractor collected, recorded, and submitted monthly readings for all customers as required by contract. Use the listing of metered gas users and the random sampling procedures to select the gas meters to be checked. Collect the meter readings from the selected locations and compare them with those furnished by the contractor. The readings should agree, with allowance for usage between the two readings. Check contractor documentation to see that unusually high usages are identified and confirmed by the contractor as having a reasonable cause or as indicating a possible leak. Unjustifiably high customer or master meter readings must be satisfactorily explained and the condition resolved.

4. Odorization is measured.

Select random times quarterly to accompany the contractor's representative to observe measurement of gas odorization content. The contractor is responsible only for checking the content and reporting the results to the KO and the gas supplier, who is responsible for corrective action.

5. Documentation for emergency operations is current.

Check that the contractor's documentation for emergency operations is updated annually. The documentation must include:

- a. An emergency plan reflecting system changes, and
  - b. An outline of procedures for responding to system failures.
6. The required annual reports are submitted to regulatory agencies and the KO.

Verify that the contractor submitted all required annual reports to the U.S. Department of Transportation and, if required, to the appropriate state regulatory agencies. Copies of all reports must be submitted to the KO. These reports must be complete, acceptable, and timely.

7. "As-built" drawings are updated with changes and corrections.

Verify that the contractor is maintaining current "as-built" drawings of natural gas distribution facilities and equipment. Check to see that the drawings are updated annually with all changes and corrections. The drafter's initials and the date should accompany each change.

8. An adequate library of equipment manufacturers' manuals is being maintained.

Verify that the contractor maintains an adequate library of manufacturers' manuals for equipment and facilities. Manuals should be obtained for newly installed equipment and obsolete manuals should be discarded.

#### *Recommended Surveillance Approach*

- Evaluate performance indicators #1 and #2 monthly using the 100 percent inspection method.
- Evaluate performance indicator #3 monthly using random sampling (normal surveillance, 10 percent AQL).
- Evaluate performance indicator #4 quarterly using random sampling (normal surveillance, 10 percent AQL).
- Evaluate performance indicators #5 through #8 annually using the 100 percent inspection method.

#### **Natural Gas Distribution Maintenance**

##### *Performance Indicators and Detailed Inspection Tasks*

The following numeric items are performed by the contractor. The related detailed inspection tasks are used by the QAE to verify the contractor's performance.

1. Maintenance documentation is complete, legible, and timely.

Verify that the contractor's maintenance documentation is complete, legible, and timely. The documentation should include, as a minimum:

- a. The annual schedule for leakage surveys.

- b. A map showing areas surveyed for leaks and the methods used.
  - c. Documentation of annual maintenance of key distribution valves, testing of relief devices, and inspection and maintenance of regulator stations.
  - d. A list of repairs.
2. The Preventive Maintenance Inspection (PMI) reports are complete, legible, and timely.

Check to see that the contractor's PMI report is complete, legible, and timely. Verify that all facilities scheduled for a PMI are recorded on the contractor's PMI report.

3. The Preventive Maintenance (PM) program is performed, and the PM report is complete, timely, and shows no deficiencies.

Verify that the contractor performed PM and that the PM report is complete, timely, and shows no deficiencies. Check to see that all facilities scheduled for PM have been recorded on the contractor's PM report.

To perform the inspections, use the contractor's PM records to determine the facilities to be sampled, including all areas specified by the KO. Schedule the inspections so that the contractor may be present. Use Army Technical Manual (ATM) 5-654, *Maintenance and Operations of Gas Systems* (3 November 1970) and the Department of Transportation's (DOT's) *Guidance Manual for Operators of Small Gas Systems* (February 1991) to inspect the distribution system. Document discrepancies between the QAE inspection and the contractor's PM report. If discrepancies are found, verify that the contractor notes in the next PMI report any repairs made.

4. Random leakage checks verify the contractor's reports.

Make random gas leakage checks to verify the contractor's reports. Verify that customer reports of suspected gas leaks are investigated by the contractor and that the suspected leaks are repaired or found invalid.

Independently conduct a random inspection of highly critical areas within the gas distribution system. QA instrumentation is recommended to check for gas leaks. In addition, become familiar with the visible effects that gas leaks have on vegetation. In walking or driving through the area being inspected, a trained observer can detect any change in the appearance of the plant life that could be caused by a gas leak in the immediate vicinity. Prime inspection areas are schools, hospitals, and other areas where gas leaks would pose significant health and safety risks. ATM 5-654 and DOT's *Guidance Manual for Operators of Small Gas Systems* include material on this subject.

5. Contracted Service Order (SO) and Individual Job Order (IJO) work is done in a timely, effective, and professional manner.

Verify that the contracted SO and IJO work is done in a timely, effective, and professional manner. Repairs should restore service to affected areas within a reasonable time and should be done in accordance with ATM 5-654.

Check to see that the overall quality and appearance of the repair, including materials, is comparable to the facility's original construction quality and appearance. Verify that the repair site is clear of construction debris and that excavated areas are graded to match the surrounding area. Conduct an unscheduled return visit to the repair site to see that excavated areas that have settled are reshaped and repaired to conform with the surrounding area.

In addition to random sampling, use the Service Order Questionnaire to obtain supplemental feedback from customers.

6. Cathodic protection for storage tanks and underground piping is adequate.

Check all storage tank and underground piping cathodic protection equipment to ensure that adequate protection against corrosion still exists.

7. All natural gas distribution equipment, pipe networks, and pertinent surfaces are free of corrosion and have adequate protective coatings.

Check to see that all natural gas distribution equipment, pipe networks, and pertinent surfaces are free of corrosion and have adequate protective coatings. QA instrumentation is recommended to check for corrosion/coating condition.

8. The annual inspection and maintenance of natural gas facilities is adequate.

Verify that the annual inspection and maintenance of natural gas facilities is adequate. Using the contractor's report of work completed, accompany the contractor to randomly selected locations where key distribution valves, relief valves, or regulator stations have received annual inspection and maintenance. Verify that the devices operate properly and are free from gas leaks. QA instrumentation is recommended to check for gas leaks. Check to see that the contractor's O&M documentation describes the inspection, maintenance, and recommendations for upgrading, repairing, or replacing these devices, if appropriate. Verify that devices show evidence of proper care.

#### *Recommended Surveillance Approach*

- Evaluate performance indicators #1, #2, and #3 monthly using the 100 percent inspection method.
- Evaluate performance indicator #4 monthly using random sampling (normal surveillance, 10 percent AQL).
- For performance indicator #5, evaluate SOs monthly using random sampling (normal surveillance, 5 percent AQL) and questionnaire feedback, and evaluate IJOs monthly using the 100 percent inspection method.
- Evaluate performance indicators #6 and #7 annually using the 100 percent inspection method.
- Evaluate performance indicator #8 annually using random sampling (normal surveillance, 10 percent AQL).



## ACRONYMS

AQL	Acceptable Quality Level
ATM	Army Technical Manual
COR	Contracting Officer's Representative
DEH	Director of Engineering and Housing
KO	Contracting Officer
MIL-STD	Military Standard
O&M	Operations and Maintenance
QA	Quality Assurance
QAE	Quality Assurance Evaluator
QASP	QA Surveillance Plan

## REFERENCES

- Army Technical Manual 5-654, *Maintenance and Operations of Gas Systems* (Headquarters, Department of the Army, 3 November 1970).
- Guidance Manual for Operators of Small Gas Systems* (Department of Transportation, February 1991).
- Johnson, James, Special Report FF-93/DRAFT, *Catalog of Industrial Instrumentation for Army Real Property Quality Assurance Applications* (U.S. Army Construction Engineering Research Laboratory, 1993).
- Military Standard 105E, *Sampling Procedures and Tables for Inspection by Attributes* (Department of Defense, 10 May 1989).

## APPENDIX A: Inspection Sampling Tables

Table A1

Sample Sizes and Reject Levels (4% AQL)  
(As developed from Tables I & II in MIL STD 105E)

Population Size	Normal Surveillance			Increased (Tightened) Surveillance			Reduced Surveillance		
	Class II Sample Size	Reject Level		Class III Sample Size	Reject Level		Class I Sample Size	Reject Level	
08 to 50	*	25%	1	*	40%	1	*	-	-
51 to 90	E	13	2	F	20	2	*	3%	1
91 to 150	F	20	3	G	32	3	*	3%	1
151 to 280	G	32	4	H	50	4	E	5	2
281 to 500	H	50	6	J	80	6	F	8	3
501 to 1200	J	80	8	K	125	9	G	13	4
1201 to 3200	K	125	11	L	200	13	H	20	5

The Reject Level is the number of failed inspections requiring rejection of the Lot (population).  
An asterisk (\*) indicates that the sample level is outside the range of a 4% AQL for the selected class.

Table A2

Sample Sizes and Reject Levels (10% AQL)  
(As developed from Tables I & II in MIL STD 105E)

Population Size	Normal Surveillance			Increased (Tightened) Surveillance			Reduced Surveillance		
	Class II Sample Size	Reject Level		Class III Sample Size	Reject Level		Class I Sample Size	Reject Level	
06 to 15	*	33%	1	*	50%	1	*	-	-
16 to 25	C	5	2	D	8	2	*	8%	1
26 to 50	D	8	3	E	13	3	C	2	2
51 to 90	E	13	4	F	20	4	C	2	2
91 to 150	F	20	6	G	32	6	D	3	3
151 to 280	G	32	8	H	50	9	E	5	4
281 to 500	H	50	11	J	80	13	F	8	5
501 to 1200	J	80	15	K	125	19	G	13	6
1201 to 3200	K	125	22	L	200	19	H	20	8

The Reject Level is the number of failed inspections that require rejection of the Lot (population).  
An asterisk (\*) indicates that the sample level is outside the range of a 10% AQL for the selected class.

Table A3

## Random Numbers

2	6	1	6	9	3	5	5	1	1	3	1	2	5	5	1	7	8	7	5	6	6	8	4	4	9	4	6	2	8	9	3	5
1	8	1	4	5	9	2	7	2	2	5	4	9	1	9	2	9	4	9	2	9	3	6	3	5	1	4	3	1	1	1	6	1
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2	6	4	8	1	5	4	9	7	1	7	3	3	7	2	1	7	4	4	7	7	8	2	7	5	7	6	5	6	6	2	5	8
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**APPENDIX B: QAE Inspection Worksheets**

**Natural Gas Distribution Operations Worksheet**

**Page 1 of 5**

**Performance Indicator #1:** The operations activities checklist is complete, legible, and timely.

- a. All items are listed, dated, and initialed as complete.

S      U      N

- b. The checklist is timely.

S      U      N

- c. The checklist includes information about:

- (1) Leakage surveys
- (2) Valve maintenance
- (3) Relief device testing
- (4) Regulator station inspection
- (5) Odorization content measurement
- (6) Repairs
- (7) System use measurement.

S      U      N

**Remarks:**

**Performance Indicator #2:** An adequate spare parts inventory is being maintained in case of emergency repairs.

S      U      N

**Remarks:**

## Page 2 of 5

**b. Unusually high usages are identified, investigated, and resolved.**

## LOCATION

[illegible]

18

**Performance Indicator #4:** Odorization is measured.

Using the population size\_\_\_\_\_, and referring to normal surveillance in Tables A1 and A2 gives\_\_\_\_\_number of samples and\_\_\_\_\_number of allowable rejects.

**LOCATION**

_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N

**Remarks:**

**Performance Indicator #5:** Documentation for emergency operations is current.

a. The emergency plan is up to date.

S      U      N

b. The outline of procedures for responding to system failures is up to date.

S      U      N

**Remarks:**

**Performance Indicator #6:** The required annual reports are submitted to regulatory agencies and the KO.

- a. The reports are complete and legible.

S      U      N

- b. All appropriate regulatory agencies and the KO received copies of reports when due.

S      U      N

Remarks:

**Performance Indicator #7:** "As-built" drawings are updated with changes and corrections.

- a. The draftperson's initials appear with each change.

S      U      N

- b. The date of change appears with each correction.

S      U      N

Remarks:

**Performance Indicator #8:** An adequate library of equipment manufacturers' manuals is being maintained.

- a. Manuals for new equipment have been obtained.

S      U      N

- b. Obsolete manuals have been properly discarded.

S      U      N

Remarks:

---

**Quality Assurance Evaluator**

---

**Date**



**Performance Indicator #1:** The maintenance documentation is complete, legible, and timely.

- a. The documentation includes the annual schedule for leakage surveys.

S      U      N

- b. The documentation includes a map showing areas surveyed for leaks and the methods used.

S      U      N

- c. The documentation includes annual maintenance and inspection of major system components.

S      U      N

- d. The documentation includes repairs.

S      U      N

- e. The documentation is legible and timely.

S      U      N

Remarks:

**Performance Indicator #2:** The PMI reports are complete, legible, and timely.

- a. The PMI report is complete and timely.

S      U      N

- b. Facilities scheduled for PMIs are recorded as such.

S      U      N

Remarks:

## Page 2 of 7

- a. PM was adequately performed by the contractor.
- b. The PM report is complete and timely.

[illegible]

23

## Page 3 of 7

- a. QA instrumentation detected no gas leaks in prime inspection areas.
- b. Vegetation shows no signs of potential gas leaks.

**LOCATION**[illegible]

24



**Performance Indicator #6:** Cathodic protection for storage tanks and underground piping is adequate.

LOCATION			
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N

Remarks:

**Performance Indicator #7:** All natural gas distribution equipment, pipe networks, and pertinent surfaces are free of corrosion and have adequate protective coatings.

LOCATION

	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N
	S	U	N

Remarks:

**Performance Indicator #8:** The annual inspection and maintenance of natural gas facilities is adequate.

- a. All devices operate properly, are free of gas leaks, and show signs of proper care.
- b. Documentation describes the inspections, maintenance, and recommendations for upgrading, repair, or replacement of devices.

Using the population size\_\_\_\_\_, and referring to normal surveillance in Tables A1 and A2 gives\_\_\_\_\_number of samples and\_\_\_\_\_number of allowable rejects.

LOCATION

_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N
_____	S	U	N

Remarks:

\_\_\_\_\_  
Quality Assurance Evaluator

\_\_\_\_\_  
Date

## Service Order Questionnaire

Page 1 of 2

This survey should be completed with information from the person having the most contact with maintenance personnel. Please circle the letter of the answer selected or answer in the blanks, as appropriate.

1. Response (in days) to repair requested work:

- a) Excellent response (normal conditions - 7 days)  
(emergency conditions - 1 day)
- b) Adequate response (within 2 weeks)
- c) Too long (Approximately how long? \_\_\_\_ days.)

2. Quality of work: (Are you satisfied that quality work was performed?)

Yes \_\_\_\_ No \_\_\_\_

Defect was not fixed \_\_\_\_.

Explain: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

3. Cleanup of area after repair: (Is area left as clean as it was before work personnel arrived?)

Yes \_\_\_\_ No \_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

4. Efforts of work personnel: (Are you satisfied that the work was performed in a professional, effective manner?)

Comments: \_\_\_\_\_  
\_\_\_\_\_

5. Attitude of work personnel: (Are they helpful, friendly, courteous, cheerful?)

Comments: \_\_\_\_\_  
\_\_\_\_\_

6. Could this type of repair be accomplished as "self help" if material and instructions were supplied?

Yes \_\_\_\_

No \_\_\_\_

Maybe \_\_\_\_



**7. Remarks:**

**Thank you for your cooperation.**

---

**Quality Assurance Evaluator**

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**Date Questionnaire Completed**

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ATTN: CEHEC-IM-LH (2)  
ATTN: CEHEC-IM-LP (2)  
ATTN: CERD-L

### CECPW 22060

ATTN: CECPW-FM-S  
ATTN: CECPW-FM  
ATTN: CECPW-FB  
ATTN: CECPW-FU  
ATTN: CECPW-F-DPN

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### US Army Engr Division

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### INSCOM

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### HQ XVIII Airborne Corps 28307

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ATTN: DEH  
ATTN: APEN-A

### HQ USEUCOM 09128

ATTN: ECJ4-LIE

### AMMRC 02172

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ATTN: DRXMR-WE

### CEWES 39180

ATTN: Library

### CECRL 03755

ATTN: Library

### USA AMCOM

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### USAARMC 40121

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ATTN: MTW-IE 94626

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Fort McNair

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### US Military Academy 10996

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